Claims

What is claimed is:

1. An electrical structure comprising a conductive button, said conductive button including:

a dielectric core; and

a conductive wiring helically wound circumferentially around the dielectric core, wherein the conductive wiring terminates in at least two end contacts at a first end of the conductive button, and wherein the conductive wiring terminates in at least two end contacts at a second end of the conductive button.

2. The electrical structure of claim 1, wherein being helically wound includes being braided.

3. The electrical structure of claim 1, wherein being helically wound includes being served.

4. The electrical structure of claim 1, wherein being helically wound includes being helically wound in no more than one rotational direction, and wherein the one rotational direction is selected from the group consisting of a clockwise direction and a counter clockwise direction.

5. The electrical structure of claim 1, wherein the conductive wiring has a diameter between about 1 mil and about 5 mils.

6. The electrical structure of claim 1, wherein the conductive wiring includes a conductive material selected from the group consisting of copper, a copper alloy, nickel, palladium, and platinum.

7. The electrical structure of claim 1, wherein the dielectric core includes a dielectric material having a hardness between about 37A and about 56D on a Shore scale.

8. The electrical structure of claim 1, wherein the dielectric core has axial grooves along an outer surface of the dielectric core.

9. The electrical structure of claim 1, wherein the dielectric core has an axial through hole at a radial center of the dielectric core.

10. The electrical structure of claim 1, wherein the dielectric core has a foamed structure.

11. An electrical structure comprising a conductive button, said conductive button including:

a dielectric core;

a conductive wiring helically wound circumferentially around the dielectric core, wherein the conductive wiring terminates in at least two end contacts at a first end of the conductive button, and wherein the conductive wiring terminates in at least two end contacts at a second end of the conductive button; and

an outer dielectric jacket around the conductive wiring.

12. The electrical structure of claim 11, wherein being helically wound includes being braided.

13. The electrical structure of claim 11, wherein being helically wound includes being served.

14. The electrical structure of claim 11, wherein being helically wound includes being helically wound in no more than one rotational direction, and wherein the one rotational direction is selected from the group consisting of a clockwise direction and a counter clockwise direction.

15. The electrical structure of claim 11, wherein a portion of the conductive wiring is at a helical angle between about 30 degrees and about 60 degrees with respect to an axis of the button.

16. The electrical structure of claim 11, wherein at least one end contact at the first end of the button is at a node of two wires of the conductive wiring.

17. The electrical structure of claim 11, wherein the conductive wiring includes a conductive material selected from the group consisting of copper, a copper alloy, nickel, palladium, and platinum.

18. The electrical structure of claim 11, wherein the at least two end contacts of the conductive wiring at the first end of the button are coated with a noble metal.

19. The electrical structure of claim 11, wherein the conductive wiring has a diameter between about 1 mil and about 5 mils.

20. The electrical structure of claim 11, wherein the end contacts at the first end of the button each have a non-planar surface.

21. The electrical structure of claim 11, wherein the end contacts at the first end of the button each have a surface concavity toward the conductive button.

22. The electrical structure of claim 11, wherein the end contacts at the first end of the button each have a sharp edge.

23. The electrical structure of claim 11, wherein the dielectric core includes a first dielectric material having a hardness between about 37A and about 56D on a Shore scale, and wherein the

dielectric jacket includes a second dielectric material having a hardness between about 37A and about 56D on a Shore scale.

24. The electrical structure of claim 23, wherein the second dielectric material and the first dielectric material each include a same dielectric material.

25. The electrical structure of claim 11, wherein at least one of the dielectric core and the dielectric jacket includes polytetrafluoroethylene or expanded polytetrafluoroethylene.

26. The electrical structure of claim 11, wherein the dielectric core has axial grooves along an outer surface of the dielectric core.

27. The electrical structure of claim 11, wherein the dielectric core has an axial through hole at a radial center of the dielectric core.

28. The electrical structure of claim 11, wherein the dielectric core has a foamed structure.

29. The electrical structure of claim 11, wherein the dielectric core has a diameter between about 10 mils and about 20 mils.

30. The electrical structure of claim 11, wherein the dielectric core and the dielectric jacket each shrink in length during exposure to heat or ultraviolet radiation.

31. The electrical structure of claim 11, wherein the dielectric core and the dielectric jacket bond together during exposure to heat or ultraviolet radiation.

32. The electrical structure of claim 11, wherein the dielectric core, the dielectric jacket, and the conductive wiring are each compressible in a direction that is parallel to an axis of the button.

33. An electrical structure, comprising:

a first substrate having a conductive pad;

a second substrate having a conductive pad; and

a conductive button, comprising: a conductive wiring helically wound circumferentially around a dielectric core; and an outer dielectric jacket around the conductive wiring, wherein at least two end contacts at a first end of the conductive button are in mechanical and electrical contact with the conductive pad of the first substrate, and wherein at least two end contacts at a second end of the conductive button are in mechanical and electrical contact with the conductive pad of the second substrate.

34. The electrical structure of claim 33, wherein the first substrate includes a printed wiring board, and wherein the second substrate includes an electronic module.

35. The electrical structure of claim 33, wherein being helically wound includes being braided or being served.

36. The electrical structure of claim 33, wherein the dielectric core, the dielectric jacket, and the conductive wiring are each sufficiently compressible so as to accommodate up to about 8 mils of composite variability that includes a planarity of a surface of the first substrate and a planarity of a surface of the second substrate which is opposite the surface of the first substrate.

37. The electrical structure of claim 33, further comprising a dielectric place holder that holds the button, wherein the place holder is disposed between the first substrate and the second substrate.

38. The electrical structure of claim 37, wherein the button is friction held by the place holder, molded to the place holder, or glued to the place holder.

39. The electrical structure of claim 33, wherein the mechanical and electrical contact with the conductive pad of the first substrate and with the conductive pad of the second substrate is maintained by a force upon each said pad, said force directed toward the button from each said pad.

40. The electrical structure of claim 39, wherein the electrical structure is clamped, and wherein the force upon each said pad results from the electrical structure being clamped.

41. An electrical structure, comprising:

a first substrate having a conductive pad;

a second substrate having a conductive pad; and

a conductive button, comprising: a conductive wiring helically wound circumferentially around a dielectric core; and an outer dielectric jacket around the conductive wiring, wherein at least two end contacts at a first end of the conductive button are in mechanical and electrical contact with the conductive pad of the first substrate, wherein at least two end contacts at a second end of the conductive button are in mechanical and electrical contact with the conductive pad of the second substrate, wherein the mechanical and electrical contact with the conductive pad of the first substrate is maintained by a force upon each said pad, said force directed toward the button from each said pad, and wherein the at least two end contacts at the second end of the conductive button are solderably coupled to the conductive pad of the second substrate.

42. An electrical structure, comprising:

a first substrate having a conductive pad;

a second substrate having a conductive pad; and

a conductive button, comprising: a conductive wiring helically wound circumferentially around a dielectric core; and an outer dielectric jacket around the conductive wiring, wherein at least two end contacts at a first end of the conductive button are in mechanical and electrical contact with the conductive pad of the first substrate, wherein at least two end contacts at a second end of the conductive button are in mechanical and electrical contact with the conductive pad of the second substrate, wherein the at least two end contacts at the first end of the conductive button are solderably coupled to the conductive pad of the first substrate, and wherein the at least two end contacts at the second end of the conductive button are solderably coupled to the conductive pad of the second substrate.

43. A method for forming an electrical structure; comprising:

providing a dielectric core;

helically winding a conductive wiring circumferentially around the dielectric core; and

cutting at an angle to an axis of the dielectric core, through the conductive wiring and through the dielectric core, at two locations along the axis, leaving a conductive button between the two location as having a first end and a second end, wherein the conductive wiring terminates in at least two end contacts at the first end, and wherein the conductive wiring terminates in at least two end contacts at the second end.

44. The method of claim 43, wherein the helically winding includes braiding.

45. The method of claim 43, wherein the helically winding includes serving.

46. The method of claim 43, wherein the helically winding includes helically winding in no more than one rotational direction, and wherein the one rotational direction is selected from the group consisting of a clockwise direction and a counter clockwise direction.

47. The method of claim 43, further comprising forming axial grooves along an outer surface of the dielectric core.

48. The method of claim 43, further comprising forming an axial through hole at a radial center of the dielectric core.

49. A method for forming an electrical structure; comprising:

providing a dielectric core;

helically winding a conductive wiring circumferentially around the dielectric core;

forming an outer dielectric jacket around the conductive wiring; and

cutting at an angle to an axis of the dielectric core, through the dielectric jacket and through the conductive wiring and through the dielectric core, at two locations along the axis, leaving a conductive button between the two location as having a first end and a second end, wherein the conductive wiring terminates in at least two end contacts at the first end, and wherein the conductive wiring terminates in at least two end contacts at the second end.

50. The method of claim 49, wherein the helically winding includes braiding.

51. The method of claim 49, wherein the helically winding includes serving.

52. The method of claim 49, wherein the helically winding includes helically winding in no more than one rotational direction, and wherein the one rotational direction is selected from the group consisting of a clockwise direction and a counter clockwise direction.

53. The method of claim 49, wherein the helically winding includes helically winding a portion of the conductive wiring at a helical angle between about 30 degrees and about 60 degrees with respect to an axis of the button.

54. The method of claim 49, wherein the cutting includes cutting through a node of two wires of the conductive wiring.

55. The method of claim 49, further comprising coating the at least two end contacts of the conductive wiring at the first end of the button with a noble metal.

56. The method of claim 49, wherein the cutting includes cutting by lasering.

57. The method of claim 49, wherein the cutting includes cutting by electrical discharge machining (EDM).

58. The method of claim 49, further comprising forming axial grooves along an outer surface of the dielectric core.

59. The method of claim 49, further comprising forming an axial through hole at a radial center of the dielectric core.

60. A method for forming an electrical structure, comprising:

providing a dielectric core;

helically winding a conductive wiring circumferentially around the dielectric core;

forming an outer dielectric jacket around the conductive wiring;

cutting at an angle to an axis of the dielectric core, through the dielectric jacket and through the conductive wiring and through the dielectric core, at two locations along the axis, leaving a conductive button between the two location as having a first end and a second end, wherein the conductive wiring terminates in at least two end contacts at the first end, and wherein the conductive wiring terminates in at least two end contacts at the second end;

providing a first substrate and a second substrate;

mechanically and electrically coupling the at least two end contacts at the first end of the button to a conductive pad of the first substrate; and

mechanically and electrically coupling the at least two end contacts at the second end of the button to a conductive pad of the second substrate.

61. The method of claim 60, wherein the first substrate includes a printed wiring board, and wherein the second substrate includes an electronic module.

62. The method of claim 60, further comprising:

after the cutting, placing the button in a dielectric place holder such that place holder holds the button in place; and

disposing the place holder between the first substrate and the second substrate.

63. The method of claim 62, wherein placing the button into the place holder includes friction fitting, holding, or gluing the button into the place holder.

64. The method of claim 60, further comprising:

after forming the dielectric jacket and prior to the cutting, placing the electronic structure of the dielectric jacket, conductive wiring, and dielectric core in a dielectric place holder such that place holder holds the electronic structure in place; and

after the cutting, disposing the place holder between the first substrate and the second substrate.

65. The method of claim 64, wherein placing the button into the place holder includes friction fitting, holding, or gluing the button into the place holder.

66. The method of claim 60, wherein the dielectric core, the dielectric jacket, and the conductive wiring are each sufficiently compressible so as to accommodate up to about 8 mils of composite variability that includes a planarity of a surface of the first substrate and a planarity of a surface of the second substrate which is opposite the surface of the first substrate.

67. The method of claim 60, wherein mechanically and electrically coupling the at least two end contacts at the first end of the button to the conductive pad of the first substrate and mechanically and electrically contacting the at least two end contacts at the second end of the button to the conductive pad of the second substrate includes maintaining a force upon each said pad, said force directed toward the button from each said pad.

68. The method of claim 67, wherein maintaining the force upon each said pad includes clamping the electrical structure such that the force upon each said pad results from the electrical structure being clamped.

69. A method for forming an electrical structure, comprising:

providing a dielectric core;

helically winding a conductive wiring circumferentially around the dielectric core;

forming an outer dielectric jacket around the conductive wiring;

cutting at an angle to an axis of the dielectric core, through the dielectric jacket and through the conductive wiring and through the dielectric core, at two locations along the axis, leaving a conductive button between the two location as having a first end and a second end, wherein the conductive wiring terminates in at least two end contacts at the first end, and wherein the conductive wiring terminates in at least two end contacts at the second end;

providing a first substrate and a second substrate;

mechanically and electrically coupling the at least two end contacts at the first end of the button to a conductive pad of the first substrate; and

mechanically and electrically coupling the at least two end contacts at the second end of the button to a conductive pad of the second substrate, wherein mechanically and electrically coupling the at least two end contacts at the first end of the button to the conductive pad of the first substrate includes maintaining a force upon the conductive pad of the first substrate and upon the conductive pad of the second substrate, said force directed toward the button from each said pad, and wherein mechanically and electrically coupling the at least two end contacts at the second end of the button to the conductive pad of the second substrate includes solderably coupling the at least two end contacts at the second end of the button to the conductive pad of the second substrate.

70. A method for forming an electrical structure, comprising:

providing a dielectric core;

helically winding a conductive wiring circumferentially around the dielectric core;

forming an outer dielectric jacket around the conductive wiring;

cutting at an angle to an axis of the dielectric core, through the dielectric jacket and through the conductive wiring and through the dielectric core, at two locations along the axis, leaving a conductive button between the two location as having a first end and a second end, wherein the conductive wiring terminates in at least two end contacts at the first end, and wherein the conductive wiring terminates in at least two end contacts at the second end;

providing a first substrate and a second substrate;

mechanically and electrically coupling the at least two end contacts at the first end of the button to a conductive pad of the first substrate; and

mechanically and electrically coupling the at least two end contacts at the second end of the button to a conductive pad of the second substrate, wherein mechanically and electrically coupling the at least two end contacts at the first end of the button to the conductive pad of the first substrate includes solderably coupling the at least two end contacts at the first end of the button to the conductive pad of the first substrate, and wherein mechanically and electrically coupling the at least two end contacts at the second end of the button to the conductive pad of the second substrate includes solderably coupling the at least two end contacts at the second end of the button to the conductive pad of the second substrate.